

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES

MISSOURI CLEAN WATER COMMISSION



MISSOURI STATE OPERATING PERMIT

In compliance with the Missouri Clean Water Law, (Chapter 644 R.S. Mo. as amended, hereinafter, the Law), and the Federal Water Pollution Control Act (Public Law 92-500, 92nd Congress) as amended,

Permit No. MO-0029378

Owner: United States Air Force (USAF)
Address: 509 CES/CEV 660 10th St., Ste. 211, Whiteman AFB, MO 65305-5000

Continuing Authority: Same as above
Address: Same as above

Facility Name: USAF, Whiteman Air Force Base
Facility Address: 800 CSG/CC, Whiteman AFB, MO 65305-5000

Legal Description: SE ¼, SE ¼, Sec. 32, T46N, R24W, Johnson County

Receiving Stream: Unnamed Tributary to Brewer Branch (U)
First Classified Stream and ID: Clear Fork (P)(00935)
USGS Basin & Sub-watershed No.: (10300104-040002)

is authorized to discharge from the facility described herein, in accordance with the effluent limitations and monitoring requirements as set forth herein:

FACILITY DESCRIPTION

Outfall #001 - Air Force Base (Federal Facility) - SIC #4952

Trickling Filter/anaerobic digestion/sludge is disposed of by land application and/or hauled to a solid waste landfill.

Design population equivalent is 13,300.

Design flow is 2.19 MGD.

Actual flow is 0.636 MGD.

Actual sludge production is 42 dry tons/year.

Outfall #002 - Instream (downstream) compliance point 100 yards below Outfall #001.

Outfall #003 - Instream (upstream) monitoring point 10 yards above Outfall #001.

This permit authorizes only wastewater discharges under the Missouri Clean Water Law and the National Pollutant Discharge Elimination System; it does not apply to other regulated areas. This permit may be appealed in accordance with Section 644.051.6 of the Law.

April 5, 2002

Effective Date

April 4, 2007

Expiration Date

MO 780-0041 (10-93)


Stephen M. Mahford, Director, Department of Natural Resources
Executive Secretary, Clean Water Commission

Interim Director of Staff, Clean Water Commission

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS					PAGE NUMBER 2 of 9	
					PERMIT NUMBER MO-0029378	
The permittee is authorized to discharge from outfall(s) with serial number(s) as specified in the application for this permit. The final effluent limitations shall become effective upon issuance and remain in effect until expiration of the permit. Such discharges shall be controlled, limited and monitored by the permittee as specified below:						
OUTFALL NUMBER AND EFFLUENT PARAMETER(S)	UNITS	FINAL EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
<u>Outfall #001</u>						
Flow	MGD	*		*	once/weekday**	24 hr. total
Biochemical Oxygen Demand, June 1 - September 30 October 1 - May 31	mg/L		15 20	10 15	once/week	24 hr. composite
Chemical Oxygen Demand June 1 - September 30 October 1 - May 31	mg/L	90 120		60 90	once/week	24 hr. composite
Total Suspended Solids	mg/L		20	15	once/week	24 hr. composite
Oil & Grease	mg/L	20		15	once/week	grab
pH - Units	SU	***		***	once/week	grab
Temperature	°F	****		****	once/week	grab
Copper, Total Recoverable	µg/L	43		43	once/month	grab
Lead, Total Recoverable	µg/L	20		20	once/month	grab
Zinc, Total Recoverable	µg/L	150		150	once/month	grab
Cyanide, Amenable to Chlorination	µg/L	22		22	once/month	grab
Phenols, Total	µg/L	100		100	once/month	grab
Silver, Total Recoverable	µg/L	8.2		8.2	once/month	grab
Ammonia as N June 1 - September 30 October 1 - May 31	mg/L	3 4.5		2 3.5	once/month	grab
MONITORING REPORTS SHALL BE SUBMITTED <u>MONTHLY</u> ; THE FIRST REPORT IS DUE <u>May 28, 2002</u> .						
Total Toxic Organics (Note 1)	mg/L	*		*	once/year in April	grab
Whole Effluent Toxicity (WET) Test	% Survival	See Special Conditions			once/year in April	24 hr. composite
MONITORING REPORTS SHALL BE SUBMITTED <u>ANNUALLY</u> ; THE FIRST REPORT IS DUE <u>October 28, 2002</u> . THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.						
B. STANDARD CONDITIONS						
IN ADDITION TO SPECIFIED CONDITIONS STATED HEREIN, THIS PERMIT IS SUBJECT TO THE ATTACHED <u>Parts I & III</u> STANDARD CONDITIONS DATED <u>October 1, 1980 and August 15, 1994</u> , AND HEREBY INCORPORATED AS THOUGH FULLY SET FORTH HEREIN.						

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS					PAGE NUMBER 3 of 9	
					PERMIT NUMBER MO-0029378	
The permittee is authorized to discharge from outfall(s) with serial number(s) as specified in the application for this permit. The final effluent limitations shall become effective upon issuance and remain in effect until expiration of the permit. Such discharges shall be controlled, limited and monitored by the permittee as specified below:						
OUTFALL NUMBER AND EFFLUENT PARAMETER(S)	UNITS	FINAL EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
<u>Outfall #002</u> - instream (downstream) compliance point						
Cyanide (Amenable to Chlorination)	mg/L	*		*	once/quarter*****	grab
pH - Units	SU	***		***	once/quarter*****	grab
<u>Outfall #003</u> - instream (upstream) monitoring point						
Cyanide (Amenable to Chlorination)	mg/L	*		*	once/quarter*****	grab
pH - Units	SU	***		***	once/quarter*****	grab
MONITORING REPORTS SHALL BE SUBMITTED <u>QUARTERLY</u> ; THE FIRST REPORT IS DUE <u>July 28, 2002</u> . THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.						
B. STANDARD CONDITIONS						
IN ADDITION TO SPECIFIED CONDITIONS STATED HEREIN, THIS PERMIT IS SUBJECT TO THE ATTACHED <u>Parts I & III</u> STANDARD CONDITIONS DATED <u>October 1, 1980 and August 15, 1994</u> , AND HEREBY INCORPORATED AS THOUGH FULLY SET FORTH HEREIN.						

MO 780-0010 (8/91)

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (continued)

- * Monitoring requirement only.
- ** Once each weekday means Monday, Tuesday, Wednesday, Thursday, and Friday.
- *** pH is measured in pH units and is not to be averaged. The pH is limited to the range of 6.0-9.0 pH units.
- **** Effluent shall not elevate or depress the temperature of the receiving stream beyond the mixing zone more than five (5°F). The stream temperature beyond the mixing zone shall not exceed ninety (90°F) due to the effluent.
- ***** Sample once per quarter in the months of January, April, July, and October.

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (continued)

Note 1 - Total Toxic Organics

Acenaphthene	4-chlorophenyl phenyl ether
Acrolein	4-bromophenyl phenyl ether
Acrylonitrile	Bis (2-chloroisopropyl) ether
Benzene	Bis (2-chloroethoxy) methane
Benidine	Methylene Chloride (dichloromethane)
Carbon Tetrachloride (tetrachloromethane)	Methyl Chloride (chloromethane)
Chlorobenzene	Methyl bromide (bromomethane)
1,2,4-trichlorobenzene	Bromoform (tribromomethane)
Hexachlorobenzene	Dichlorobromomethane
1,2-dichloroethane	Chlorodibromomethane
1,1,1-trichloroethane	Hexachlorobutadiene
Hexachloroethane	Hexachlorocyclopentadiene
1,1-dichloroethane	Isophorone
1,1,2-trichloroethane	Naphthalene
1,1,2,2-tetrachloroethane	Nitrobenzene
Chloroethane	2-nitrophenol
Bis (2-chloroethyl) ether	4-nitrophenol
2-chloroethyl vinyl ether	2,4-dinitrophenol
N-nitrosodi-n-propylamine	4,6-dintro-o-cresol
Pentachlorophenol	N-nitrosodimethylamine
Phenol	N-nitrosodiphenylamine
Bis (2-ethylhexyl) phthalate	Phenanthrene
Butyl benzyl phthalate	1,2,5,6-dibenzanthracene
(dibenzo(a,h)anthracene)	
Di-n-butyl phthalate	Indeno (1,2,3-cd) pyrene (2,3-o-phenylene
pyrene)	
Di-n-octyl phthalate	Pyrene
Diethyl phthalate	Tetrachloroethylene
Dimethyl phthalate	Toluene
1,2-benzanthracene (benzo(a)anthracene)	Trichloroethylene
Benzo(a)pyrene (3,4-benzopyrene)	Vinyl Chloride (chloroethylene)
3,4-benzofluoranthene (benzo(b)fluoranthene)	Aldrin
11,12-benzofluoranthene (benzo(k)fluoranthene)	Dieldrin
Chrysene	Chlordane (technical mixture and metabolites)
Anthracene	4,4-DDT
1,12-benzoperylene (benzo(ghi)perylene)	4,4-DDE (p,p-DDX)
Fluorene	4,4-DDD (p,p-TDE)
2-chloronaphthalene	Alpha-endosulfan
2,4,6-trichlorophenol	Beta-endosulfan
Parachlorometa cresol	Endosulfan sulfate
Chloroform (trichloromethane)	Endrin
2-chlorophenol	Endrin aldehyde
1,2-dichlorobenzene	Heptachlor
1,3-dichlorobenzene	Heptachlor epoxide (BHC)
hexachlorocyclohexane)	
1,4-dichlorobenzene	Alpha-BHC
3,3-dichlorobenzidine	Beta-BHC
1,1-dichloroethylene	Gamma-BHC
1,2-trans-dichloroethylene	Delta-BHC (PCB polychlorinated biphenyls)
2,4-dichlorophenol	PCB-1242 (Arochlor 1242)
1,2-dichloropropane (1,3-dichloropropane)	PCB-1254 (Arochlor 1254)
2,4-dimethylphenol	PCB-1221 (Arochlor 1221)
2,4-dinitrotoluene	PCB-1232 (Arochlor 1232)
2,6-dinitrotoluene	PCB-1248 (Arochlor 1248)
1,2-diphenylhydrazine	PCB-1260 (Arochlor 1260)
Ethylbenzene	PCB-1016 (Arochlor 1016)
Fluoranthene Toxaphene	

C. SPECIAL CONDITIONS

1. This permit may be reopened and modified, or alternatively revoked and reissued, to:
 - (a) Comply with any applicable effluent standard or limitation issued or approved under Sections 301(b)(2)(C) and (D), 304(b)(2), and 307(a) (2) of the Clean Water Act, if the effluent standard or limitation so issued or approved:
 - (1) contains different conditions or is otherwise more stringent than any effluent limitation in the permit; or
 - (2) controls any pollutant not limited in the permit.
 - (b) Incorporate new or modified effluent limitations or other conditions, if the result of a waste load allocation study, toxicity test or other information indicates changes are necessary to assure compliance with Missouri's Water Quality Standards.
 - (c) Incorporate new or modified effluent limitations or other conditions if, as the result of a watershed analysis, a Total Maximum Daily Load (TMDL) limitation is developed for the receiving waters which are currently included in Missouri's list of waters of the state not fully achieving the state's water quality standards, also called the 303(d) list.

The permit as modified or reissued under this paragraph shall also contain any other requirements of the Clean Water Act then applicable.

2. All outfalls must be clearly marked in the field.
3. Permittee will cease discharge by connection to areawide wastewater treatment system within 90 days of notice of its availability.
4. Changes in Discharges of Toxic Substances

The permittee shall notify the Director as soon as it knows or has reason to believe:

- (a) That any activity has occurred or will occur which would result in the discharge of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels:"
 - (1) One hundred micrograms per liter (100 µg/L);
 - (2) Two hundred micrograms per liter (200 µg/L) for acrolein and acrylonitrile; five hundred micrograms per liter (500 µg/L) for 2,5 dinitrophenol and for 2-methyl-4, 6-dinitrophenol; and one milligram per liter (1 mg/L) for antimony;
 - (3) Five (5) times the maximum concentration value reported for the pollutant in the permit application;
 - (4) The level established in Part A of the permit by the Director.
 - (b) That they have begun or expect to begin to use or manufacture as an intermediate or final product or byproduct any toxic pollutant, which was not reported in the permit application.
5. Report as no-discharge when a discharge does not occur during the report period.
 6. Sludge and Biosolids Use For Domestic Wastewater Treatment Facilities
 - (a) Permittee shall comply with the pollutant limitations, monitoring, reporting, and other requirements in accordance with the attached permit Standard Conditions.
 - (b) If sludge is not removed by a contract hauler, permittee is authorized to land apply biosolids that are removed from the domestic wastewater treatment lagoon during lagoon clean-out and maintenance activities. Permit Standard Conditions, Part III shall apply to the land application of biosolids. Permittee shall notify the department at least 180 days prior to the planned removal of biosolids from the lagoon. The department may require submittal of a biosolids management plan for department review and approval as determined appropriate on a case-by-case basis.

C. SPECIAL CONDITIONS (continued)

7. General Criteria. The following water quality criteria shall be applicable to all waters of the state at all times including mixing zones. No water contaminant, by itself or in combination with other substances, shall prevent the waters of the state from meeting the following conditions:
- (a) Waters shall be free from substances in sufficient amounts to cause the formation of putrescent, unsightly or harmful bottom deposits or prevent full maintenance of beneficial uses;
 - (b) Waters shall be free from oil, scum and floating debris in sufficient amounts to be unsightly or prevent full maintenance of beneficial uses;
 - (c) Waters shall be free from substances in sufficient amounts to cause unsightly color or turbidity, offensive odor or prevent full maintenance of beneficial uses;
 - (d) Waters shall be free from substances or conditions in sufficient amounts to result in toxicity to human, animal or aquatic life;
 - (e) There shall be no significant human health hazard from incidental contact with the water;
 - (f) There shall be no acute toxicity to livestock or wildlife watering;
 - (g) Waters shall be free from physical, chemical or hydrologic changes that would impair the natural biological community;
 - (h) Waters shall be free from used tires, car bodies, appliances, demolition debris, used vehicles or equipment and solid waste as defined in Missouri's Solid Waste Law, section 260.200, RSMo, except as the use of such materials is specifically permitted pursuant to section 260.200-260.247.
8. Whole Effluent Toxicity (WET) tests shall be conducted as follows:

SUMMARY OF WET TESTING FOR THIS PERMIT				
OUTFALL	A.E.C. %	FREQUENCY	SAMPLE TYPE	MONTH
Interim #001	100	once/year	24 hr. composite	April
Final #001	100	once/year	24 hr. composite	April

a. Test Schedule and Follow-Up Requirements

- (1) Perform a single-dilution test in the months and at the frequency specified above.

If the effluent passes the test, do not repeat the test until the next test period. Submit results with the annual report.

If the effluent fails the test, a multiple dilution test shall be performed within 30 days, and biweekly thereafter, until one of the following conditions are met:

- (a) THREE CONSECUTIVE MULTIPLE-DILUTION TESTS PASS. No further tests need to be performed until next regularly scheduled test period.
- (b) A TOTAL OF THREE MULTIPLE-DILUTION TESTS FAIL.

C. SPECIAL CONDITIONS (continued)

8. Whole Effluent Toxicity (WET) (continued)

a. Test Schedule and Follow-Up Requirements (continued)

- (2) The permittee shall submit a summary of all test results for the test series to the WPCP, Planning Section, P.O. Box 176, Jefferson City, MO 65102 within 14 days of the third failed test. DNR will contact the permittee with initial guidance on conducting a toxicity identification evaluation (TIE) or toxicity reduction evaluation (TRE). The permittee shall submit a plan for conducting a TIE or TRE to the Planning Section of the WPCP within 60 days of the date of DNR's letter. This plan must be approved by DNR before the TIE or TRE is begun. A schedule for completing the TIE or TRE shall be established in the plan approval.
- (3) Upon DNR's approval, the TIE/TRE schedule may be modified if toxicity is intermittent during the TIE/TRE investigations. A revised WET test schedule may be established by DNR for this period.
- (4) If a previously completed TIE has clearly identified the cause of toxicity, additional TIEs will not be required as long as effluent characteristics remain essentially unchanged and the permittee is proceeding according to a DNR approved schedule to complete a TRE and reduce toxicity. Regularly scheduled WET testing as required in the permit, without the follow-up requirements, will be required during this period.
- (5) In addition to the WET test summary report required in part (2), all failing test results shall be reported to DNR within 14 days of the availability of the results.
- (6) All WET test results for the reporting period shall be summarized and submitted to DNR by the end of the following October. When WET test sampling is required to run over one DMR period, each DMR report shall contain information generated during the reporting period.

b. PASS/FAIL procedure and effluent limitations

- (1) To pass a single-dilution test, mortality observed in the AEC test concentration shall not be significantly different (at the 95% confidence level; $p = 0.05$) than that observed in the upstream receiving-water control sample. The appropriate statistical tests of significance will be those outlined in the most current USEPA acute toxicity manual or those specified by the MDNR.
- (2) To pass a multiple-dilution test:
 - (a) the computed percent effluent at the edge of the zone of initial dilution, Acceptable Effluent Concentration (AEC), must be less than three-tenths (0.3) of the LC_{50} concentration for the most sensitive of the test organisms; or,
 - (b) all dilutions equal to or greater than the AEC must be nontoxic. Failure of one multiple-dilution test is an effluent limit violation.

C. SPECIAL CONDITIONS (continued)

8. Whole Effluent Toxicity (WET) (continued)

c. Test Conditions

- (1) Test species: *Ceriodaphnia dubia* and *Pimephales promelas* (fathead minnow). Organisms used in WET testing should come from cultures reared for the purpose of conducting toxicity tests and should be cultured in a manner consistent with the most current USEPA guidelines. All test animals should be cultured as described in EPA-600/4-90/027.
- (2) Test period: 48 hours at the "Acceptable Effluent Concentration" (AEC) specified above.
- (3) When dilutions are required, upstream receiving stream water shall be used as dilution water. If upstream water is unavailable or if mortality in the upstream water exceeds 10%, "reconstituted" water will be used as dilution water. Procedures for generating reconstituted water will be supplied by the MDNR upon request.
- (4) Tests should be initiated immediately after the sample is collected, but tests must be initiated no later than 36 hours after sample collection.
- (5) Single-dilution tests will be run with:
 - (a) Effluent at the AEC concentration;
 - (b) 100% receiving-stream water (if available), collected upstream of the outfall at a point beyond any influence of the effluent; and
 - (c) reconstituted water.
- (6) Multiple-dilution tests will be run with:
 - (a) 100%, 50%, 25%, 12.5%, and 6.25% effluent, unless the AEC is less than 25% effluent, in which case dilutions will be 4 times the AEC, two times the AEC, AEC, 1/2 AEC and 1/4 AEC;
 - (b) 100% receiving-stream water (if available), collected upstream of the outfall at a point beyond any influence of the effluent; and
 - (c) reconstituted water.
- (7) If reconstituted-water control mortality for a test species exceeds 10%, the entire test will be rerun.

SUMMARY OF TEST METHODOLOGY FOR WHOLE-EFFLUENT TOXICITY TESTS

Whole-effluent-toxicity test required in NPDES permits shall use the following test conditions when performing single or multiple dilution methods. Any future changes in methodology will be supplied to the permittee by the Missouri Department of Natural Resources (MDNR). Unless otherwise specified by MDNR, procedures should be consistent with Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, EPA/600/4-90/027.

Test conditions for Ceriodaphnia dubia:

Test duration:	48 h
Temperature:	25 ± 2°C
Light Quality:	Ambient laboratory illumination
Photoperiod:	16 h light, 8 h dark
Size of test vessel:	30 mL (minimum)
Volume of test solution:	15 mL (minimum)
Age of test organisms:	<24 h old
No. of animals/test vessel:	5
No. of replicates/concentration:	4
No. of organisms/concentration:	20 (minimum)
Feeding regime:	None (feed prior to test)
Aeration:	None
Dilution water:	Upstream receiving water; if no upstream flow, synthetic water modified to reflect effluent hardness.
Endpoint:	Mortality (Statistically significant difference from upstream receiving water control at $p \leq 0.05$)
Test acceptability criterion:	90% or greater survival in controls

Test conditions for (Pimephales promelas):

Test duration:	48 h
Temperature:	25 ± 2°C
Light Quality:	Ambient laboratory illumination
Photoperiod:	16 h light/ 8 h dark
Size of test vessel:	250 mL (minimum)
Volume of test solution:	200 mL (minimum)
Age of test organisms:	1-14 days (all same age)
No. of animals/test vessel:	10
No. of replicates/concentration:	4 (minimum) single dilution method 2 (minimum) multiple dilution method
No. of organisms/concentration:	40 (minimum) single dilution method 20 (minimum) multiple dilution method
Feeding regime:	None (feed prior to test)
Aeration:	None, unless DO concentration falls below 4.0 mg/L; rate should not exceed 100 bubbles/min.
Dilution water:	Upstream receiving water; if no upstream flow, synthetic water modified to reflect effluent hardness.
Endpoint:	Mortality (Statistically significant difference from upstream receiving water control at $p \leq 0.05$)
Test Acceptability criterion:	90% or greater survival in controls

Date of Fact Sheet: October 10, 1996

Date of Public Notice: January 18, 2002

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT
FACT SHEET

This Fact Sheet explains the applicable regulations, rationale for development of this permit and the public participation process.

NPDES PERMIT NUMBER: MO-0029378

FACILITY NAME: Whiteman Air Force Base

OWNER NAME: U.S. Air Force

LOCATION: Sec. 32, T46N, R24W, Johnson County

RECEIVING STREAM: Brewer Branch (Blackwater River Basin)(10300104-23-01)

FACILITY CONTACT PERSON: Edward K. Lenz

TELEPHONE: (816) 687-6218

FACILITY DESCRIPTION AND RATIONALE

The Whiteman Air Force Base wastewater treatment facility is a trickling filter system with primary and secondary settling. The design population equivalent is 13,300 and the design flow is 1.26 million gallons per day. The average actual flow is 500,000 gallons per day. Sludge is treated in anaerobic digesters before being disposed of by land application or removal to a landfill. The design sludge production is 180 dry tons per year. The actual sludge production is approximately 70 dry tons per year.

The limits for this facility were based on the effluent regulations and water quality standards in 10 CSR 20-7 (water quality review sheet prepared by Planning Section is attached).

Interim limits are being proposed because Air Force Base is constructing a wetlands.

This permit will be issued for a period of five years.

WATER QUALITY REVIEW SHEET

NAME OF FACILITY: Whiteman Air Force Base

NPDES PERMIT NO: MO-0029378

RECEIVING STREAM: Tributary to Clear Fork (Brewer Branch); 1.5 miles to Clear Fork

RIVER REACH NO: 10300104-23-01

LEVEL OF ANALYSIS: Level III (QUAL 2E steady-state model)

STP DESIGN FLOW: 7Q10 low flow of "0" for both immediate tributary and Clear Fork

STREAM CLASSIFICATION: Brewer Branch is unclassified; Clear Fork is Class C
(intermittent flow; permanent pools)

BENEFICIAL USES: Brewer Branch: no designated beneficial uses Clear Fork: livestock, wildlife watering; aquatic life protection (limited warm-water fishery). The "limited fishery" designation is in recognition of the prairie stream aquatic-community type and the 7Q10 low flow of less than 0.1 cfs.

CRITERIA OF CONCERN: Dissolved oxygen, ammonia, metals, cyanide, phenol

INSTREAM CRITERIA:

Dissolved oxygen: Water Quality Standards Table A minimum dissolved oxygen criterion is 5 mg/L; however, where natural concentrations fall below that value, 5 mg/L is a minimum average value for the diurnal cycle. Monitoring at other prairie streams and sampling of Clear Fork above Whiteman AFB indicate that early-morning dissolved oxygen may be lower than 5 mg/L under natural low-flow, hot-weather conditions. The Water Quality Standards allow wasteload allocations to be based on these "background" concentrations: 4 mg/L is considered an appropriate warm-weather diurnal minimum for Clear Creek.

Ammonia: A maximum of 2.0 mg/L--warm weather (pH: 7.8; temp: 26°C)
3.2 mg/L--cool weather (pH: 7.8; temp: 8°C)

Other pollutants: (Chronic aquatic-life-protection criteria for limited warm-water fishery; medium water hardness)

Cu--	43 ug/L
Pb--	20 ug/L
Zn--	1505 ug/L
Ag--	.12 ug/L (NOTE: chronic criteria deleted in 1994 Standards)
phenol--	100 ug/L
CN--	5 ug/L

Reference: 1991, 1994 Water Quality Standards, Tables A and B

MIXING ZONES: Mixing zones are areas of pollutant dilution and attenuation in classified waters, within which chronic criteria may be exempted. However, in this case, with part of the immediate receiving stream and the first classified stream flowing through a state park, allowance for a mixing zone in Clear Fork is not considered advisable. That is, chronic-toxicity criteria should be met in Clear Fork immediately below Brewer Branch.

Reference: 1991 Water Quality Standards

ANTIDEGRADATION CONSIDERATIONS: As a baseline, water quality necessary to protect designated uses shall be maintained. However, "When water quality exceeds level necessary to protect beneficial uses, that quality shall be fully maintained and protected" (from Water Quality Standards). Because Brewer Branch and Clear Fork flow through a state park, a stringent position regarding protection of aesthetics and aquatic life in both streams is required. A rather high-quality effluent is currently being discharged; a lower effluent quality would degrade the stream and violate the antidegradation provisions. Therefore, no lowering of water quality should be allowed.

DESCRIPTION OF RECEIVING WATERS: Brewer Branch appears to have good gradient and velocity at the limited access points; it is reported to have sizeable pools also. There is normally no flow above the STP. Clear Fork is a prairie-type, fairly low-gradient, turbid stream with limited riffles; it drains a mixture of forested land, cropland, and pasture. About one mile below the discharge, Brewer Branch enters Knob Noster State Park; Clear Fork flows through the park for about three miles below its confluence with Brewer Branch. Brewer Branch and Clear Fork are removed from the main development in the park, although an equestrian trail crosses and then follows the streams for some distance.

FACILITY INFORMATION: The STP is a trickling filter with a design PE of 10,000 and current limits of "30/30" for BOD and NFR, with limits for metals. DMRs for the past year indicate that BODs average about 20 mg/L, and recent warm-weather samples indicate BODs usually less than 15 mg/L. Effluent-ammonia data has been collected monthly since the beginning of 1991--levels have consistently been less than 1 mg/L.

OTHER POINT SOURCES: The city of Knob Noster discharges to Clear Fork about 4 miles below the entry of Brewer Branch. The Whiteman STP effluent is not expected to affect the stream in that area. Other discharges to Clear Fork are minor in nature.

NONPOINT SOURCES: Nutrients from agricultural sources contribute to algae production and turbidity in this type of stream. Livestock-watering use of this type stream is also common--livestock wastes directly entering the stream may contribute nutrient, solids, and oxygen-demanding material.

FIELD DATA:

----MDNR low-flow visual survey; limited dissolved-oxygen and ammonia data, 1987
----MDNR one-day CBOD and ammonia data, November 1990
----Air Force--several years of weekly dissolved-oxygen and BOD readings immediately above and below the STP, and ½ mile below the STP
----MDNR visual survey and limited dissolved-oxygen and ammonia data from Brewer Branch, June 1991
----MDNR low-flow, dissolved oxygen and NH₃N data; July 1991

SUMMARY OF FIELD DATA AND MODEL DEVELOPMENT:

A summary of the receiving-stream data collected is attached; these data generally indicate acceptable in-stream water quality. An earlier survey indicated an impact on Brewer Branch (including the lower reach within the state park), but no impact on Clear Fork. AFB data ½ mile below the STP (and above the park) has indicated low warm-weather dissolved oxygen. No ammonia violations have been noted in Clear Fork. The July 1991 data was taken in hot, dry weather when adverse effects should be most evident, and yet the impacts on the stream were minimal, although one low dissolved-oxygen value and some excess algae were noted just below Brewer Branch.

In-stream reaeration-decay rates cannot be precisely determined with the generally good effluent quality, and a model for dissolved oxygen and ammonia prediction cannot be accurately calibrated. Estimates were made regarding reaeration and decay rates, and stream morphometry and hydraulics. Inputs were similar to other streams in the area. With these and the observed data, a model was constructed. The recommended effluent limits appear to be necessary to meet dissolved-oxygen and ammonia criteria in Clear Fork, and to assure compliance with stringent antidegradation provisions in both receiving streams.

WASTELOAD ALLOCATION LIMITS:

BOD - June - Sept.	10 mg/L
Oct. - May	15 mg/L
NH3N - June - Sept.	2 mg/L
Oct. - May	3.5 mg/L
NFR -	15 mg/L

EPA guidance recommends that WLA values be used as daily maximum values. However, in this case, there is some uncertainty in the model predictions and considering the present minimal impact on the stream, we recommend that the permit include the following values:

	<u>monthly ave.</u>	<u>weekly ave.daily max.</u>
BOD		
June - Sept.	10	15
Oct. - May	15	20
NFR	15	20
NH3N		
June - Sept.	2	3
Oct. - May	3.5	4.5

Oil and Grease--same as existing limits.

Effluent limits for other substances limited in the existing permit are:

Cu-- 43 ug/L
Pb-- 20 ug/L
Zn-- 1505 ug/L
Ag-- 8.2 (NOTE: A chronic criterion is no longer included in the 1994 Standards; the acute criterion of 8.2 ug/L should be used.)
phenol- 100 ug/L
Cn-- 5 ug/L (NOTE: The acute criterion of 22 ug/L is acceptable as an effluent limit if WET tests continue to indicate no toxicity and quarterly in-stream monitoring in Clear Creek indicate no values above 5 ug/L.)

The above are based on aquatic-life criteria, "0" flow in the receiving streams, and no loss of metals. Effluent limits should be expressed as "total recoverable" metals (monthly averages. Cyanide should be expressed as "amenable to chlorination".

ATTACHMENTS: Model input and output files

REVIEWER: RG SECTION CHIEF: JH, JM
DATE: 9-13-91 (several subsequent updates compiled on 6-25-96)